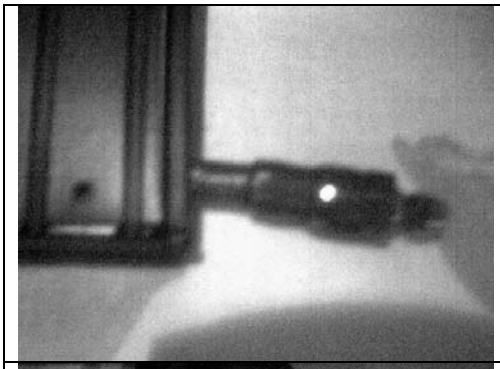
SECTION 4

WS-66 Usage

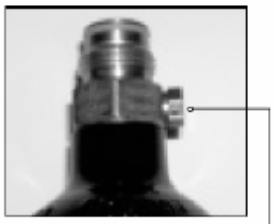
- Air Source Safety
- Applying Air Source
- Firing Marker (dry)

WARNING

The power system used on the Warsensor WS-66 Tactical Marker contains compressed gas or air. NEVER work on, disassemble the marker with the compressed air source connected. The marker has a volumizer chamber which will retain air pressure. Please ensure your air source is properly turned off, and the marker is cleared of all compression before disassembly. If working with CO2 avoid CO2 gas or escaping liquid to contact the skin – it can cause freezer burn. Always ensure your power source bottle is firmly screwed in to avoid accidental release which could cause bodily harm.

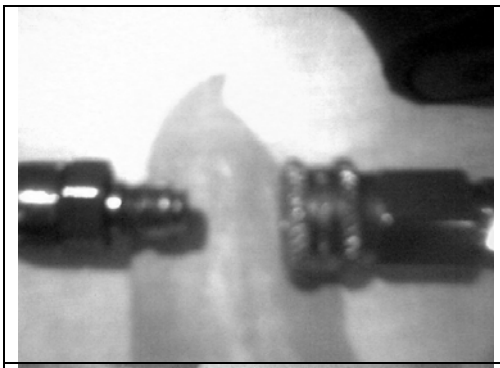
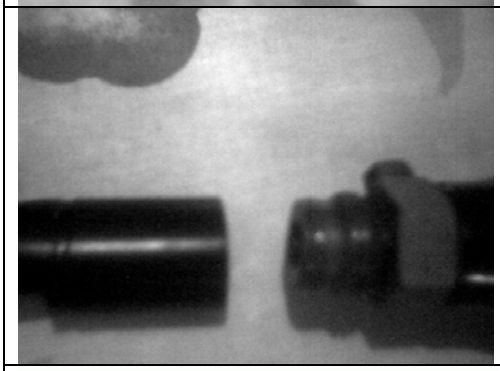
	Before attaching any power source to the WS-66, review the power-source connection options available to you on the WS-66 The marker is factory configured to use a remote line direct to the quick-release nipple which exits the marker at the back end of the magazine, just under the trigger. Any standard remote should snap right on.	**NOTES OR COMMENTS** **Please ensure the quick release lock on the remote is properly secured. It should snap forward locking the remote onto the nipple. If it is not secured, activating the power source may cause the remote to become detached under pressure and WILL blow the o-rings in the head. The pressure of such a release could cause injury if the remote was to strike the body, or face.**
	The second option for players who prefer to play without a remote is to attach the bottom line adapter onto the marker- It comes complete with the necessary adapter to snap on to the quick release nipple, and the screws to fasten it to the bottom of the trigger frame. With this option installed, you can screw the compressed gas/air power source directly on to the marker…or use a remote line with screw in ASA nipple	**The WS-66 is capable of operating at input pressures ranging from 450psi to 1200psi. It is not recommended to operate the marker below or beyond these limits as this will severely hamper the performance and could damage the marker**

SAFETY RULES FOR HANDLING COMPRESSED AIR OR GAS MUST BE FOLLOWED AT ALL TIMES!

 Figure 5 Safety burst disk.	Never leave a pressurized marker or air source in direct sunlight – in particular if using CO2 as an air source. Excessive heat can cause internal pressures to build beyond safe levels and could cause safety burst disks to rupture if the bottle is sitting erect. If the bottle is lying on its side – the excessive pressure could cause a burst which could damage the marker, or the air bottles valve system.	**Cylinder valve (the copper neck on the air bottle) should be firmly, and fully connected to the air bottle. Make a mark on your bottle and inspect this regularly to see if it has moved.** **A loose cylinder valve under pressure can be extremely dangerous – the air bottle would become a high speed projectile which could cause serious damage or death.**

During filling, if any leaks are detected, immediately stop the filling process and examine the power source for the location of the leak. If it is leaking from the fill adapter's ASA it could be that the o-ring on the bottle is worn and needs replacement –bleed off ALL excess pressure, remove bottle, change o-ring and resume filling.

If the leak is coming from the connection between the Cylinder valve and the bottle body – cease filling, use a hard tool such as a screwdriver or other item to depress the pin valve and release ALL pressure from the bottle . If you have an on/off valve open it to release the pressure. Have the bottle inspected by a US – DOT certified air-smith or compressed air specialist to get it repaired. DO NOT ATTEMPT TO REPAIR THE BOTTLE YOURSELF!

	After you have connected the remote line to the ASA Cylinder valve head of your power source. DO NOTACTIVATE THE AIR SOURCE. First connect the quick release portion of the remote line to the nipple on the marker. Ensure that it snap-locks into place. Only after you have done this should you consider activating the air source – we will get to that in just a bit, for now, lets just make certain the air source is properly setup and connected to the WS-66.	**If you are depressuring the marker – first turn off the remote line air source at the bottle – then fire the marker a few times to deplete any excess compressed gas/air before removing the quick release.**
	Using the bottom line setup is just as simple – Your air source can screw directly into the optional bottom line attachment once properly affixed to the marker. Line up your air source and with a clockwise motion, screw the bottle onto the ASA until you get a tight fit and the bottle STOPS. For bottles with an on/off valve – ensure it is OFF when doing this. If the bottle is pin-valve driven, remember to COCK the marker first. Screwing on a pin-valve driven bottle will immediately engage the compressed gas/air and ready the marker.	**NOTE – if your air source does not have an on/off valve, please remember to hold marker upside down, while slowly unscrewing the bottle, and firing the marker at the same time to release pressure buildup. At a certain point the pin-valve will disengage allowing you to totally de-pressure the marker and making removal of the bottle both easier – and SAFE! Holding the marker upside down, ensures that no paintballs can enter the breach accidentally (in particular if using a gravity hopper)**
	Once your air source is properly installed, if you haven't already done so, COCK THE MARKER by pulling back on the top rear cocking handle as illustrated. At this point you may activate the air source (unless it is a directly screwed on pin-valve driven bottle on the bottomline ASA). YOUR MARKER IS NOW COCKED AND READY FOR FIRING. Please observe all necessary safety precautions when firing the marker.	

To fire the marker – depress the trigger safety to the LEFT (red ring showing). The safety is now OFF. This puts the trigger in active mode and makes the marker ready-to-fire.

DRY FIRE the marker a few times to get used to the feel of the trigger, and the marker under pressure. Practice firing the marker with air on –observe the reaction of the marker. Turn your air source OFF (either by the on/off valve of the remote, bottle, or by slightly unscrewing the bottle from the ASA bottomline, and fire the marker a few times to familiarize yourself with the entire process of running out of power on the marker – see how it reacts. Practice proper removal of the air source a few times.

WARNING: Keep hands away from escaping CO2 gas. It can cause frostbite if allowed to come in contact with skin. If the CO2 source you are using has an on/off valve, make sure it is in the "OFF POSITION" before attempting to remove it from the paintball marker. Do not expose the CO2 source to heat or store the CO2 source at temperatures above 130°F (54°C). Always follow the manufacturer's warnings listed on the CO2 source for handling and storage.

CO2/HPA/N2 INFO

CO2 (carbon dioxide)

- Stored as a liquid in cylinders and expands into a gas,
- Cannot fill compressed air or nitro into CO2 tanks,
- Cylinders typically can screw right into an ASA and has a pin valve,
- Output pressure depends on environment temperature.... 80*f is about 950psi.... 40*F is about 550psi,
- Capacity of tanks is measured in ounces,
- This gas causes velocity jumps due to liquid expansion,
- Most are made of either steel or aluminum,
- Aluminum cylinders over 2" in width needs to be tested every 5 years by hydrostatic testing,
- You can get CO2 in disposable 12g cartridges to a refillable 20oz tank,
- You can get refills pretty much at any field or store,
- When shooting with CO2, the tank will get cold. The colder the tank, less air pressure.

Nitro/Compressed Air (N2/HPA)

- Both N2 and HPA can be used interchangeably in N2/HPA specific cylinders in a gas state,
- When speaking about these tanks, both the terms N2 and HPA mean the same thing,
- Depending on size, the small units are all steel construction. More common is an aluminum cylinder wrapped in a composite or fiberglass material,
- All cylinders needs to be tested every 3 years with a maximum life of 15 years,
- All Nitro systems can typically screw into an ASA and has a built in pressure regulator (can be purchased as a fixed or adjustable output) to reduce the internal pressure of 3,000 or 4,500 psi inside the tank to around 850 psi output on a non-adjustable tank or a wide range on an adjustable tank,
- Using a HPA tank, you are not severely effected by temperature,
- HPA/Nitro tanks come in 48cu to 114cu refillable tanks in either 3,000 or 4,500 psi,
- PSI means "pound per square inch",
- not all fields can supply you with refills,
- When shooting tanks filled with N2, the tank will gradually warm.

Q: *I hear the terms CU, CI, OZ, HPA, compressed air, Nitro, and N2 when talking about tanks for paintball. What does all this mean?*

A: CU and CI mean the same thing. Just different units of measurement used. CU means Cubic Units. CI stands for Cubic Inches. This refers to the area inside of the tank that is filled. So, 68CI means there is 68 cubic inches inside of this tank. A 68CU tank has 68 cubic units inside of the tank... basically, the same size area. This term describes the size of nitro tanks.

OZ stands for ounces. This is how much liquid CO2 the tank is filled. From 4oz to 20oz.

HPA stands for High Pressure Air. Same thing as compressed air. This is the type of gas used when filling these types of tanks. Basically, it is the same air we breathe in everyday. A compressor will suck in air and jam in into the tank your filling.

A Nitro system is just another term used for HPA tanks. It is a type of gas used to fill a tank. Instead of the atmospheric air that is used to fill these tanks, it is almost pure nitrogen, or N2, that is used to fill the tank. HPA and Nitro can be use to fill the same tank specified as such. You cannot fill CO2 into a Nitro tank. Same is true about not able to fill HPA into a CO2 tank.

The difference between Nitro and HPA is when you fire a tank filled with Nitro; the tank will get a little warm as you fire it. A tank filled with HPA will not. And as many of you already know, CO2 slowly chills a CO2 tank.

So, CU and CI mean the same thing. It is the area inside of the tank to be filled. HPA and Nitro system means the same type of tank.

Q: *About how many shots can I get out of a CO2/HPA tank?*

A: It would depend on the operating pressure and general workings of your marker.

For the CO2 users, the number of shots depends on how cold the tank is and outside temperature. The warmer it is, the more the liquid CO2 will evaporate. On a typical 75* day with a marker shooting at about 850psi, you can get a rough estimate on the number of shots in the chart below.

CO2 Tanks

Tank Size	Est. Shots	Tank Size	Est. Shots
7oz	350	14oz	700
9oz	425	16oz	900
12oz	600	20oz	1100

** Remember, the more you shoot, the colder the CO2 tank will get. The colder the tank gets, the less chance the CO2 will evaporate into a gas. So the PSI will decrease.*

For Nitro, a general rule of thumb is to take the size of the tank and multiply it by 10 for a 3,000psi, 15 for a 4,500psi, or 17 for a 5,000psi tank. This will give you an approximate number of shots per fill on a marker shooting 850 psi. So a 68cu Java tank can give you about 680 shots on a 3,000-psi tank and 1,020 shots on a 4,500-psi tank (68 multiplied by 10 = 680; 68 multiplied by 15 = 1,020) on a fill. Weather doesn't affect HPA tanks that much. Good N2 tank companies are Nitro Duck, Crossfire, PMI, and ACI. If you have the money, Smart Parts has a high recharge to them.

Nitro Tanks

Tank Size	Est. Shots	Tank Size	Est. Shots
48cu 3000psi	480	48cu 4500psi	720
68cu 3000psi	680	68cu 4500psi	1020
88cu 3000psi	880	88cu 4500psi	1320
96cu 3000psi	960	96cu 4500psi	1440
110cu 3000psi	1100	110cu 4500psi	1650
114cu 3000psi	1140	114cu 4500psi	1710

The above tables are estimated shots per fill to expect from a tank. The actual shots will vary with weather, operating PSI, and overall mechanics of the marker. The above estimates is based on a marker operating at 850psi at a constant temperature of 75 degrees.

Q: *I understand that there is a regulator on a Nitro tank, should I bother with replacing the x-chamber with another regulator?*

A: All of the HPA tanks comes with a regulator built into the tank to converts the 3,000, 4,500, or 5,000 psi down to about 850psi that is used by most paintball markers. Some are preset to a certain psi output (typically 850psi). You can get an adjustable regulator on the tank that you can adjust the air from 900 to 0psi.

It is not a bad idea to do this. This setup is known as a "dual-regulating" or "double regging". It is not needed, but would not hurt either.

For most beginners, having two regulators is not needed if s/he has a Nitro tank. CO2 tanks do not have a built in regulator, so an "on gun" regulator is a good idea. Just make sure it is CO2 tolerant. Some good regulators for CO2 applications is the Bob Long Reg, the Palmers Pursuit Shop Stabilizer, Gen-X, Messiah, and I have also heard that the AKA Sidewinder does well. The Stabilizer in particular will not only regulates the pressure, but also does a great job at keeping liquid CO2 out of the marker. Not 100%. But is pretty good. CO2 has a bad habit of jumping up and down in psi because of the liquid CO2 expanding into a gas. Having a CO2 tolerant regulator will keep your velocity stable. Also, having the regulator just before the valve is the best. If you have an x-chamber *after* the regulator, you will make the regulator work extra hard.

For some heavily modified markers that use Nitro, it may be important to have certain psi input. For instance, my setup is a 110cu ACI tank (with a non-adjustable reg.) and a Vigilante on the marker. The output pressure of the tank is about 850psi. But my marker is modified to run at a much lower pressure. So the vigilante will convert that 850-psi down to my operating pressure of 300psi.

As a side note for the adjustable regulator on your Nitro tank, be careful not to turn down the tank regulator too much or you may starve your second regulator. Also, if the regulator is turned down to far and shoot fast, this can also starve the marker. This is called a 'drop-off'.

Those that want to use both CO2 and nitro off and on, pretty much any regulator will work. So long that the regulator is CO2 tolerant.

Q: *Why and where should I get testing done to my tank?*

A: Strictly for safety to you and others off and on the field. It would put a damper on a day of play if all of a sudden, your tank explodes during a game or while it was being filled. CO2 tanks should be tested every 5 years. Nitro tanks, every 3. The reason there is a difference in years is because the CO2 tanks is not subjected to the stresses that Nitro tanks are. If I remember, CO2 tanks are rated to 1600 to 1800 psi. With a properly filled tank, the internal psi is around 1000 max. A Nitro tank is subjected to either 3,000 or 4,500 psi (depending on the tank) at a constant pressure. Considerably a lot more stress than CO2.

Now, do not concern yourself about tanks exploding. This happens on very rare occasions. All tanks have a safety mechanism called a burst disk. If the psi inside the tank gets to a certain point, the burst disk will break. All of your air will exit out of the tank in two different directions. Much better than if in one direction like a rocket. These burst disks can be replaced very easily and I have instructions here.

Where to get it tested is kind of easy. Some paintball shops may offer that or may know where to send it for testing. I have heard of a place that sells scuba gear can test (or know where to send). Keyword to ask for is "hydrostatic testing".

These shops may also provide a service to fix tanks if they are damaged in some way. To help prevent some damage to the outer shell, a neoprene cover can be placed over the tank. Also a fill nipple cover can be used to keep unwanted particles from entering the tank and eventually clogging the internal regulator for nitro tanks. Thread protectors are also good to keep the threads in good condition. These can be used for both types of tanks.